



DOCKET NO: 212462US0RD

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :  
YUMIKO OYASATO, ET AL. : EXAMINER: WYROZEBSKI LEE, K. I.  
SERIAL NO: 09/964,581 :  
FILED: SEPTEMBER 28, 2001 : GROUP ART UNIT: 1714  
FOR: METHOD OF DECOMPOSING :  
THERMOSETTING RESIN, APPARATUS  
AND HEAT CONTROL PROGRAM

APPEAL BRIEF

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal of the Final Rejection dated March 26, 2004 of Claims 1, 2, 4-6 and 8-17. A Notice of Appeal, along with a petition for a two-month extension of time, was timely filed on August 26, 2004.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Kabushiki Kaisha Toshiba having an address 1-1, Shibaura 1-chome, Minato-ku, Tokyo, Japan.

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Docket No.: 212462US0RD

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313



ATTORNEYS AT LAW

RE: Application Serial No.: 09/964,581  
Applicants: Yumiko OYASATO, et al.  
Filing Date: September 28, 2001  
For: METHOD OF DECOMPOSING THERMOSETTING  
RESIN, APPARATUS AND HEAT CONTROL  
PROGRAM  
Group Art Unit: 1714  
Examiner: WYROZEBSKI LEE, K.I.

SIR:

Attached hereto for filing are the following papers:

**Appeal Brief with Appendices; Request for Extension of Time (4 months)**

Our credit card payment form in the amount of **\$2,090.00** is attached covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R. 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 15-0030. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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## II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

## III. STATUS OF THE CLAIMS

Claims 1, 2, 4-6 and 8-17 stand rejected and are herein appealed. Claims 3 and 7 are objected to but held to be drawn to allowable subject matter. Claims 18 and 19, the remaining claims in the application, stand withdrawn as being directed to a non-elected invention.

## IV. STATUS OF THE AMENDMENTS

No amendment under 37 CFR 1.116 has been filed.

## V. SUMMARY OF THE CLAIMED SUBJECT MATTER

As recited in the sole independent claim on appeal, i.e., Claim 1, the invention is a method of decomposing a thermosetting resin by a decomposer, comprising the steps of:

only pre-heating the thermosetting resin up to a preheating temperature T0;

kneading the pre-heated thermosetting resin together with a decomposer, and concurrently heating a mixture comprising the thermosetting resin and the decomposer up to a kneading temperature T1, thereby allowing a reaction to take place between the decomposer and the thermosetting resin to obtain a kneaded matter wherein the decomposer becomes consumed; and heating said kneaded matter to a maximum temperature T2 to decompose the thermosetting resin; wherein: said pre-heating temperature T0 is not higher than the boiling

temperature of said decomposer; said kneading temperature T1 is not lower than said pre-heating temperature T0 but is lower than the thermal decomposition temperature of the thermosetting resin; said maximum temperature T2 is lower than the thermal decomposition temperature of the thermosetting resin; and said pre-heating of the thermosetting resin is performed under the following conditions of temperature T0 and time t:

$$100^{\circ}\text{C} \leq T0 < 260^{\circ}\text{C}$$

$$0.5 \text{ min} \leq t \leq 7 \text{ min.}$$

See original Claim 1, and the specification at page 2, line 14 through page 3, line 2, combined with page 20, lines 20-23 and page 23, lines 9-11.

#### VI. GROUNDS OF REJECTION

(A) Claims 1, 2, 4-6, 8-12, and 17 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. 3,954,681 (Castle).

(B) Claims 13-16 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Castle in view of U.S. 5,616,623 (Münzmay et al).

#### VII. ARGUMENT

##### Ground (A)

Claims 1, 2, 4-6, 8-12, and 17 stand rejected under 35 U.S.C. § 102(b) as anticipated by Castle. That rejection is untenable and should not be sustained.

The present invention relates to a method of decomposing a thermosetting resin.

As described in the specification under “Description of the Background,” beginning at page 1, line 8, processes exist in the prior art for decomposing thermosetting resins such as

urethane resins, but they have been problematical, such as the requirement of inordinate amounts of time. The present invention addresses these problems.

As recited in Claim 1, the invention is a method of decomposing a thermosetting resin by a decomposer, comprising the steps of:

only pre-heating the thermosetting resin up to a preheating temperature T0;

kneading the pre-heated thermosetting resin together with a decomposer, and concurrently heating a mixture comprising the thermosetting resin and the decomposer up to a kneading temperature T1, thereby allowing a reaction to take place between the decomposer and the thermosetting resin to obtain a kneaded matter wherein the decomposer becomes consumed; and heating said kneaded matter to a maximum temperature T2 to decompose the thermosetting resin; wherein: said pre-heating temperature T0 is not higher than the boiling temperature of said decomposer; said kneading temperature T1 is not lower than said pre-heating temperature T0 but is lower than the thermal decomposition temperature of the thermosetting resin; said maximum temperature T2 is lower than the thermal decomposition temperature of the thermosetting resin; and said pre-heating of the thermosetting resin is performed under the following conditions of temperature T0 and time t:

$$100^{\circ}\text{C} \leq T0 < 260^{\circ}\text{C}$$

$$0.5 \text{ min} \leq t \leq 7 \text{ min.}$$

The importance of both T0 and t is demonstrated in the comparative data of record. See, for example, Tables 1 and 2, at pages 26 and 27 of the specification, respectively, for Comparative Examples 1-3, compared to Example 1. In Comparative Example 1, preheating was carried out but no subsequent heating. In Comparative Examples 2 and 3, preheating was not carried out. Table 2 shows that Example 1 resulted in a higher percentage of decomposer consumed in a shorter treatment time, with a higher quality of decomposition

(described in the specification at page 24, lines 3-13), compared to Comparative Examples 1-3. Additional comparative data appears in the specification. See the description regarding Comparative Examples 4-6, and Examples 2-33. In Comparative Example 4, there was no preheating; in Comparative Example 5, preheating occurred but for too short a time. See Tables 8 and 9, at pages 33 and 34 of the specification, respectively.

The comparative results could not have been predicted by the applied prior art.

Castle discloses a method of reclaiming cured polyurethane elastomers wherein the cured polyurethane elastomers are first put into fine particulate form, such as by soaking the elastomer in a suitable solvent to swell the polyurethane at least to a semi-brittle state so that it can be very easily crumbled to fine particle size and then removing the solvent (paragraph bridging columns 2 and 3); milling the particulate cured polyurethane under shear sufficient to generate an elevated temperature, preferably at least about 120°F and to cause the particles to form a coherent mass (column 3, lines 25-28), which may be carried out relatively rapidly such as for about two minutes or so (column 3, lines 49-53); initiating devulcanization by adding a devulcanizing agent which is a suitable aliphatic alcohol, water, or mixture thereof to the cohesive mass (paragraph bridging columns 3 and 4), wherein the operating conditions increases the temperature during the devulcanizing step to between about 120°F and 280°F (column 4, lines 31-34). In Example 1 therein, the cohesive mass is subjected to a temperature of about 220°-270°F, while the mass is being mixed in a mixer under compression, whereby water is added to the mixture and mixing is continued for 15 minutes.

It is clear from Example 1 that water is present as a devulcanizing agent therein. Other devulcanizing agents are used in some of the other examples, although it is noted that contrary to the findings by the Examiner, butanediol used in Example III and triisopropylamine used in Example V, are used as curing agents, not devulcanizing agents.

Castle neither discloses nor suggests the presently-claimed invention. Castle neither discloses nor suggests a pre-heating step, *per se*. In Castle, prior to carrying out devulcanizing, heating is carried out during the milling step, and optionally during the swelling step (column 3, lines 1-3). Castle neither discloses nor suggests the simple expedient of pre-heating, as recited herein, prior to kneading a pre-heated thermosetting resin together with a decomposer, and the superior results obtained thereby, as demonstrated in the specification and discussed above.

In response to the above arguments, the Examiner finds that Castle "uses milling as a means of heating the polyurethane waste to a temperature high enough to obtain the cohesive force." Thus, the Examiner, in effect, admits that Castle neither discloses nor suggests *only* pre-heating, as recited in Claim 1 herein. Indeed, in Castle, the step analogous to the presently-recited pre-heating step involves milling, i.e., a step wherein the polyurethane resin is changed by mechanical forces, beyond a change in temperature. Note that Applicants' argument is not that Castle does not specifically disclose the term "pre-heating," but rather that the step of Castle analogous to the presently-recited pre-heating step requires milling as well.

The Examiner states that the present claims "are very broad and therefore allow any means of pre-heating the polyurethane waste. Therefore, milling that is a source of heat qualifies. Furthermore, term cohesive form, means that the polyurethane waste had to be heated, because it is softened."

In reply, Applicants admit that there is more than one way to pre-heat. But, the claims require *only* pre-heating, which means that whatever the source of pre-heating is, it must not effect a mechanical force, for example, on the thermosetting resin.

It appears that the Examiner may have ignored the term "only" before "pre-heating" in Claim 1 as if it were new matter, although no such rejection has been made. If the Examiner believes the term is new matter and has thus read the claim as if it were not there, this is improper. Indeed, as MPEP 706.03(o), Examiner Note 3, mandates, "[a]s to any other appropriate prior art . . . rejection, the new matter must be considered as part of the claimed subject matter and can not be ignored" (emphasis added.) See also MPEP 2143.03. Thus, the Examiner must treat the claims as she finds them. Whether or not the term is new matter is a separate issue. Nevertheless, the presently-claimed invention complies with 35 U.S.C. § 112, first paragraph. One skilled in the art would have understood that the term "only" was inherently described. *See, e.g., Kennecott Corp. v. Kyocera Int'l, Inc.*, 835 F.2d 1419, 5 USPQ2d 1194 (Fed. Cir. 1987) (term "equiaxed microstructure" not literally disclosed held to be inherent property of claimed sintered ceramic body); *In re Wright*, 866 F.2d 422, 9 USPQ2d 1649 (Fed. Cir. 1989) (term "not permanently fixed thereto" not literally disclosed held to be described by absence of disclosure of permanently fixed microcapsules); and *In re Voss*, 557 F.2d 812, 194 USPQ 267 (CCPA 1977) (term "crystalline content . . . at least 50% by weight" not literally disclosed held to be described by literal disclosure of "glass-ceramic material" coupled with evidence that one skilled in the art would have attributed the recited crystalline content as inherent in that material).

In an Advisory Action entered September 21, 2004, the Examiner queries how Claim 1 can have open language of "comprising the steps of" and at the same time, a step of "only preheating . . . ." In reply, Claim 1 is open to other steps, but the recited preheating step is carried out by *only* preheating, i.e., nothing else is performed on the thermosetting resin during this step.



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In addition to the above differences discussed above, and as described in the Background section therein, Castle is concerned with partially devulcanized polyurethane elastomers, thereby breaking cross-linkages, but preserving polyurethane molecules. In other words, Castle does not want to *decompose* his polyurethane elastomers.

#### Claim 12

Claim 12, which requires an amine compound decomposer, is separately patentable, because Castle's devulcanization agent is limited to aliphatic alcohols, water, or mixtures thereof. Castle actually teaches away from the use of amines, in view of the disclosure that lower alcohol amines have been used to peptize urethane linkages (column 1, lines 45-46), since Castle wants to preserve polyurethane molecules (column 1, lines 58-64).

For all the above reasons, it is respectfully requested that this rejection be REVERSED.

Ground (B)

Claims 13-16 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Castle in view of U.S. 5,616,623 (Münzmay et al). That rejection is untenable and should not be sustained.

Münzmay et al does not remedy the above-discussed deficiencies of Castle.

Münzmay et al has been relied on for a disclosure of compounds, such as various ethanol amines and other amino alcohols, that react with polyurethanes for purposes of decomposing them. Münzmay et al is specifically concerned with compounds that contain at least two isocyanate-reactive hydrogen atoms. Such compounds include diols and triols, also disclosed by Castle. But without the present disclosure as a guide, one skilled in the art would not have combined Castle and the disclosure of ethanol amines in Münzmay et al, since Castle is limited to water and alcoholic devulcanizing agents, and in addition, wants to preserve polyurethane molecules. Moreover, even if these references were combined, the result would still not be the presently-claimed invention.

The Examiner relies on *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971) in support of the combination of Castle and Munzmay et al. In reply, *McLaughlin* is inapposite, since the rejection **does not** take into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and **does** include knowledge gleaned only from Applicants' disclosure.

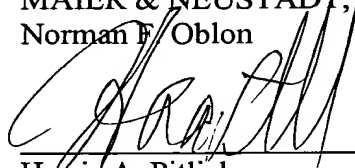
For all the above reasons, it is respectfully requested that this rejection be REVERSED.

VIII. CONCLUSION

For the above reasons, it is respectfully requested that all the rejections still pending in the Final Office Action be REVERSED.

Respectfully submitted,

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CLAIMS APPENDIX

Claim 1: A method of decomposing a thermosetting resin by a decomposer, comprising the steps of:

only pre-heating the thermosetting resin up to a preheating temperature T0;  
kneading the pre-heated thermosetting resin together with a decomposer, and concurrently heating a mixture comprising the thermosetting resin and the decomposer up to a kneading temperature T1, thereby allowing a reaction to take place between the decomposer and the thermosetting resin to obtain a kneaded matter wherein the decomposer becomes consumed; and

heating said kneaded matter to a maximum temperature T2 to decompose the thermosetting resin; wherein:

said pre-heating temperature T0 is not higher than the boiling temperature of said decomposer;

said kneading temperature T1 is not lower than said pre-heating temperature T0 but is lower than the thermal decomposition temperature of the thermosetting resin;

said maximum temperature T2 is lower than the thermal decomposition temperature of the thermosetting resin; and

said pre-heating of the thermosetting resin is performed under the following conditions of temperature T0 and time t:

$$100^{\circ}\text{C} \leq T0 < 260^{\circ}\text{C}$$

$$0.5 \text{ min} \leq t \leq 7 \text{ min.}$$

Claim 2: The method according to claim 1, wherein said preheating step is performed under the following conditions of temperature T0 and time t:

$$100^{\circ}\text{C} \leq T_0 \leq 230^{\circ}\text{C}$$

$$3.375 \leq 0.0125T_0 + t \leq 8.25$$

Claim 4: The method according to claim 1, wherein the thermosetting resin and the decomposer are present in the mixture in a ratio of thermosetting resin : decomposer of 2:3 to 1:20, based on weight.

Claim 5: The method according to claim 4, wherein ratio is 1:5 to 1:7, based on weight.

Claim 6: The method according to claim 1, wherein a temperature during said kneading step is maintained substantially constant, and the final temperature  $T_1$  thereof is substantially identical with the preheating temperature  $T_0$ .

Claim 8: The method according to claim 1, wherein said decomposer is enabled to react with and attach to said thermosetting resin during the kneading step, thereby producing an intermediate product.

Claim 9: The method according to claim 8, wherein the boiling point of said intermediate product to be produced during the kneading step is higher than the boiling point of said decomposer.

Claim 10: The method according to claim 8, wherein said thermosetting resin comprises a resin having a carbonyl group.

Claim 11: The method according to claim 10, wherein said resin having a carbonyl group is selected from the group consisting of urethane resin, urea resin and unsaturated polyester, and said intermediate product is produced through attaching of said decomposer to a carbon atom of said carbonyl group.

Claim 12: The method according to claim 11, wherein said decomposer comprises an amine compound, and said intermediate product is produced through attaching of a nitrogen atom of said amine compound to a carbon atom of said carbonyl group.

Claim 13: The method according to claim 12, wherein said amine compound is an alkanol amine.

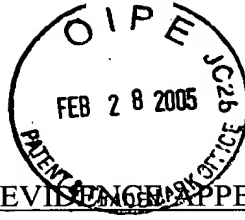
Claim 14: The method according to claim 13, wherein said alkanol amine is monoethanol amine.

Claim 15: The method according to claim 13, wherein said alkanol amine is diethanol amine.

Claim 16: The method according to claim 13, wherein said alkanol amine is triethanol amine.

Claim 17: The method according to claim 11, wherein said decomposer comprises a compound having a hydroxyl group, and said intermediate product is produced through attaching of an oxygen atom of said hydroxyl group to a carbon atom of said carbonyl group.

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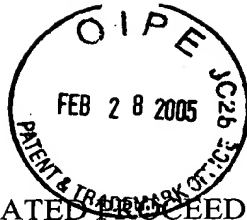


EVIDENCE APPENDIX

None.



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RELATED PROCEEDINGS APPENDIX

None.